

## **Air Pollution Baseball**

### **Number of players:**

For four to eight players, draw a baseball diamond on a piece of poster board. Use spools, buttons, or other markers to show who is at bat and on each base.

For more than eight players mark off first, second, third bases and home on the floor. Divide the group of players into two teams. Have one team line up along one side of the “diamond”; and the other team on the other side. Each player walks his way around the “diamond.”

### **Preparation:**

Make stacks of cards containing questions on air pollution. The questions for second base will be more difficult than those for first. Home run questions will be the most difficult. Some suggestions for questions are in the question bank, but you may make up more.

### **Rules:**

The rules are similar to real baseball.

Flip a coin to see which team goes first. The first person at “bat” may choose whether he wants to try for first, second, third base, or a home run.

After he has chosen the base he wants, the pitcher asks him a question corresponding to that base. (Example: The player wants to try for second base. The pitcher asks a question from the second base stack of cards. If the player answers correctly, he walks to second base.)

The next person at bat chooses second base also. He does not answer the question correctly, so he is “out” and the scorekeeper marks one out for that team.

The third person at bat chooses a home run. He answers the question correctly. He walks around the bases to “home,” pushing player home also. The scorekeeper marks two runs.

A team may continue at bat until it receives three outs. When that happens, the opposite team goes to bat.

At the end of a predetermined number of “innings” or length of time, the team with the most runs wins.

**Helpful Hints:** This game can get rowdy, especially when there are 20 to 30 players. To prevent this, make it clear at the beginning that if anyone talks out of turn, gives an answer to someone else, scuffles in line, etc., a run will be taken away from his team.

Also, make it clear at the beginning that the teacher is the umpire, and the umpire's judgement is final. Arguing with the umpire will result in a lost run.

If a player answers incorrectly, let someone else answer (although no points will be given). Discuss the answer. Perhaps, the next time the question is asked, the answer will be remembered.

## **Environmental Question Bank**

### **Air**

#### **General Air Questions**

1. Air consists of a mixture of gases. What are these gases?

Nitrogen, oxygen, carbon dioxide, small amounts of other gases, and water vapor.

2. What is air pollution?

Things in the air that don't belong there

3. What are three causes of air pollution?

Cars, factories, lawn mowers, fires, volcanos etc.

4. Name one thing you can do to help fight air pollution.

Answers will vary

5. What are the main federal law that governs air quality?

The Federal Clean Air Act and FCAA Amendments

6. What are the six air pollutants currently regulated by federal law?

Particulate, ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead.

7. What is a particulate?

It is a microscopic particle in the air.

8. What is the main particulate of concern in the DFW area?

Soot

9. Is ozone a liquid, solid, or gas?

Ozone is a gas.

10. Where does air pollution go?

It moves along with the wind and if it gets high enough will enter the jet stream and sometimes travel thousands of miles. It eventually settles to the land or water.

11. Name forms of natural air pollution?

Smoke from forest fires, dust and gases from volcanoes.

12. Do you think it would be better to ride the bus to school, or have your parents drive?

Explain your answer.

13. What are some causes of ground level ozone pollution?

Anything that produces VOCs or NO<sub>x</sub> during hot, sunny days.

14. What are the benefits of planting trees?

Trees produce oxygen that animals need to breath. Also decrease soil temperatures, shade increase humidity, provide food and shelter for people and animals.

15. Name the Texas cities that are nonattainment for the EPA ozone standard.

Houston, Dallas, Ft Worth, and Beaumont are always in this group.

16. What four things combine to make ozone?

VOCs, Nitrogen dioxide, bright sunlight and low wind speed.

17. Which one of these (refer to question number #4) can we control?

Nitrogen dioxide, VOCs (partially)

18. What are the factors that determine an ozone action day?

Low winds, high temperatures, sun, high ozone count the day before

19. Is smog greater in the summer or winter?

Summer

20. Name three things you should do on ozone action days.

Car pool, mow or refuel late in the evening, walk or ride a bike, stay indoors.

21. If people are aware that automobiles are a major cause of ozone pollution why don't they car pool?

mainly for inconvenience reasons

22. Name one of the 6 Pollution Gremlins and describe where it comes from.

Sulfur Dioxide-burned coal and fuel oil; Nitrogen Dioxide-fuels burned by cars, electric power plants; lead-from smelters; ozone-combination of sunlight and chemicals; particulate, particles of smoke or dust; carbon monoxide-fuel burned quickly without enough air, mainly from car exhausts, fires, etc...

23. What time of day should drivers fill their car with gas to avoid adding to ozone?

Late afternoon or evening

24. What is a temperature inversion?

A meteorological condition in which pollutants are trapped in a layer of warm, stagnant air. Held in place by a layer of cold air.

25. What effect does air pollution have on animal life?

answers will vary

26. What part of our body is affected the most by ozone?

Lungs

27. Are all pollution sources man-made?

No, volcanoes, fires, decay, biological processes

28. When the air is polluted, can we always see and smell it?

no

29. Millions of years ago, what were two sources of air pollution ?

dust storms and volcanos

30. Do most states have laws against air pollution?

yes

31. What is the major pollutant in smog?

Ozone

32. Which pollutants make our rain more acidic?

Sulfur dioxide and nitrogen dioxide

33. Which pollutant causes a yellow-brown haze?

Nitrogen dioxide

34. Does carbon monoxide have a color?

No

35. Can you smell carbon monoxide?

No

### **Air True/False**

1. We can manufacture more air.

False

2. Automobiles are a major source of air pollution.

True

3. Air pollution exists in the country as well as in the city.

True

4. The federal government has laws against air pollution.

True

5. Burning trash causes air pollution.

True

6. Saving energy reduces air pollution.

True

7. We save energy when we use less hot water.

True

8. Burning oil or gas or coal causes air pollution?

True

9. Humans can live only a few minutes without air.

True

10. Before the industrial revolution, there was no air pollution.

False: Even before the existence of humans, there was air pollution caused by dust storms, volcanos, and decaying vegetation.

11. All smokestack emissions pollute the air.

False: Most smokestack emissions seen today in Texas consist of steam. Modern emissions control methods have eliminated more than 95 percent of the pollutants coming from smokestacks.

12. Clean air is the responsibility of industry alone.

False: It is everyone's job. Industry, auto manufacturers, concerned citizens and federal, state and local air control agencies must work together to control air pollution. About half of air pollution comes from vehicles.

13. The only way air pollution affects the human body is by causing lung disorders.

False: Although air pollution can aggravate lung and bronchial disorders, it also can irritate eyes and cause sore throats, dizziness, headaches, and nasal problems. Under extreme conditions, it even can cause death.

14. Air pollution now is under control and will not be a problem in the future.

False: Although we have made significant progress toward the control and prevention of air pollution in Texas, in the future there will be more people, more cars, more trash, and more power needed. Air pollution will remain a concern to all of us for years to come.

### **Air Jeopardy Questions**

1. A: The cause for an Ozone Action Day alert.

Q: What is a the condition where the levels of ground level ozone are expected to be above specific guidelines?

2. A: Three things to do on an Ozone Action Day.

Q: What are walking, bicycling, waiting to fill the car with gas, waiting to mow the lawn, car pooling, and/or being careful if you have asthma?

3. A: A particulate.

Q: What is a small particle of dust or smoke or small droplet in the air?

4. A: The way a particulate can harm your body.

Q: What is lodging in your lungs and producing scar tissue that keeps your lungs from expanding?

5. A: The definition of acid rain.

Q: What is rainfall that has combined with air pollution such as sulfur dioxide and nitrogen dioxide to decrease the pH and increase acidity of the rain?

6. A: How ozone levels lower in the evening.

Q: What is caused by the lack of heat and the lack of energy for the reaction to occur that causes ozone to form?

## **Water**

### **Water Conservation Questions**

1. Why should we conserve water? Because we cannot make anymore. Only 1% of the water on Earth is in rivers, lakes, rain, and ground water.

2. Is there an unlimited amount of clean water? No

3. Can we produce new water? No, all the water on the earth has been here all along

4. Is most of the surface of the earth made up of water? Yes

5. What are two sources of our water supply? Ground water and surface water

6. What is water conservation? Making the most efficient use of our water

7. What are three things that you could do to conserve water? Use a shower instead of a bath, don't let the water run when you brush your teeth, and install a water conserving toilet, not

pollute water, run washing machines only when full, etc...

8 . How could you implement a water conservation plan in your house? Various answers.

9 . Which of the following is an example of conserving water?

- A) washing a car in a river without a bucket
- B) flushing a bug down the toilet
- C) taking a five minute shower

Answer: C - taking a five minute shower

10. Which of the following is an example of wasting water?

- A) turning off the water while brushing your teeth
- B) washing your dog on the lawn
- C) letting the water run for 10 minutes so the water will heat up

Answer C) letting the water run for 10 minutes so the water will heat up.

11. Who are the three main users of water? List them in order from most to least.

Agriculture, industry, individuals

12. What sprinkler system would even out the peaks of water use and extend the life of a water plant? Answer: The odd/even day sprinkler system would extend the life of a water plant Instead of watering every day, you water every other day.

13.What is xeriscaping? Answer: the conservation of water and energy through landscaping with plants suited to the local climate.

14. What are two benefits from xeriscaping? Answer: Conservation of water and less waste (grass clippings) that goes into landfills.

15. What is a watershed? Answer: A drainage basin that feeds water into a stream.

### **Water Quality/Testing Questions**

1 . What is water pollution?

Things in the water that don't belong there or are there in levels that are too high.

2 . What are three causes of water pollution?

pouring things in storm drains, boats, dumping things on the ground, air pollution settling.

3. Name one thing you can do to help fight water pollution.

answers will vary

4 . What makes the most water pollution?



dumping things on the ground and the rains bringing it to the water source

5. What effect does water pollution have on animal life?

answers will vary

6. What does a waste treatment plant do?

Cleans waste water so it is safe to put back into the environment.

7. How long does it take to clean wastewater?

Average of 14 to 16 days (depending on the wastewater treatment plant).

8 . Where does the reclaimed water go once it is cleaned at the wastewater plant?

Reclaimed water is pumped into lakes where it will go through the treatment plant, then to the homes. Sometimes reclaimed water will be used for irrigation.

9 . What is used by the wastewater plant to digest the actual wastewater?

microorganisms to eat the waste in the water

10. What are two types of water disinfectant used by water treatment plants?

chlorine, ozone/uv radiation

11. What is the water called that has been cleaned and ready for reuse at a wastewater plant?

Reclaimed or recycled water

12. List 4 factors that may influence testing for water quality.

Time of year, temperature, wind, weather, man-made examples such as dams.

13. Why would we do a bug count in a stream?

It gives us information about the living conditions in the stream

14. What is needed for organisms to survive in a stream?

Oxygen, structures to cling to and hide in, food

15. What is a meniscus?

A curve in the water surface when measuring it.

16. What in water conducts electricity?

The salt ions in the water.

17. What is pH?

A way to say how acidic or basic water is.

18. Why would you want to know the pH of water?

This would tell you what kinds of things could live in the water and whether or not it was suitable for drinking.

19. What is a secchi disc?

It is a tool to measure the clarity of water.

20. Why is it important to take a duplicate sample when making a test for water quality?

Duplicate samples are necessary to ensure accuracy in testing. You want to make sure you have a good sample and you didn't make a mistake in testing.

21. What does D.O. stand for?

dissolved oxygen

22. If there is a low dissolved oxygen level in a creek, will there be much life in the creek?

There will be very little life compared with creeks with higher DO.

23. What level of D.O. will support game fish?

5 ppm.

24. What is PPM?

Parts Per Million, a ratio of one part of something to 1 millionth parts of water

25. How do water temperature and dissolved oxygen affect each other?

The lower the temperature, the more oxygen the water can hold.

26. How does water movement affect the DO level of water?

Turbulence causes the dissolved oxygen level to rise

27. Why do you need to have an aerator for fish in an aquarium?

This helps the water dissolve more oxygen and makes the environment more favorable to live in for fish.

28. What is a benefit to Storm Drain Stenciling?

It reminds you that dumping chemicals or debris greatly increase the level of nonpoint source pollutants in creeks.

29. What is a reference site?

a water site that would represent good water quality

30. What is nonpoint source pollution?

Pollution from a source that is not permitted. Example: Someone dumping oil into a storm drain which flows directly into our waterways or fertilizer run-off from lawns.

31. Give two examples of nonpoint source pollution.

rinsing a paint brush in the yard, pouring used oil on the ground or in a storm drain, over fertilizing your yard, topping off your car's gas tank, air pollution settling.

32. How does fertilizer pollute water?

If it rains after someone has fertilized their lawn a lot of that fertilizer is going to be washed off of the lawn into the street and down into the storm sewers, which lead to streams and rivers. It then causes too much algae to grow, polluting the stream.

33. Should motor oil be poured into the street drain?

no

34. In Texas if anything is poured into the street drain, where does it go?

directly to the nearest body of water

### **Water Jeopardy Questions**

1. A: The number one use for water.

Q: What is agriculture? (65 percent)

2. A: The definition of a meniscus.

Q: What is the curve of a liquid that is caused by the surface tension

3. A: The conservation of water and energy through native landscaping.

Q: What is Xeriscaping?

4. A: Attractive landscapes, low maintenance, energy conservation, pest tolerance, and drought tolerance

Q: What might convince someone to use Xeriscaping?

5. A: How you could find out what plants to use for Xeriscaping.

Q: What is asking a local plant nursery or contacting the city agricultural department?

6. A: Water with a pH level of less than seven.

Q: What is an acid?

7. A: The affects of low temperature on dissolved oxygen levels.

Q: What causes water to hold more dissolved oxygen?

8.. A: Influences on water quality.

Q: What are temperature, pollution, pH level, chloride levels, rainfall, surrounding land, and copper levels?

9. A: The aphotic layers of water.

Q: What are layers of water that are not penetrated by sun light?

10. A: The compensation point.

Q: What is the point in water where the sun no longer penetrates, the point where the photic and aphotic layers meet?

11.. A: Nonpoint source pollution.

Q: What is pollution caused when rainfall carries pollutants from a variety of sources into surface water or groundwater that is not traceable to a single source point?

12. A: The components of a stream system in which a beaver dam or other modification would be classified.

Q: What is a secondary habitat?

13. A: The area by a stream where land and water meet.

Q: What is a Riparian Zone?

14. A: Ways to promote water conservation at home.

Q: What are use low flow toilets, check for leaking toilets, reduce the time in the shower, use a high-efficiency, low-flow showerhead, only water the lawn every few days, use ground covers and shrubs native to your area, use sink aerators, and turn off water when not in use.

15. A: The difference between surface and groundwater.

Q: What is water that stays on the surface versus water that remains below the ground's surface?

16. A: An aquifer.

Q: What is the stratum of earth that holds water in permeable rock, sand, or gravel?

17. A: A watershed.

Q: What is a geographic area in which water, sediments, and dissolved material drain into a common outlet?

18. A: The valuable resource for life.

Q: What is water?

## **Waste**

### **Waste Questions**

1. Why do we recycle?

to save resources and land fill space by producing less waste to conserve natural resources.

2. Name three things that you can recycle instead of throwing them away.

paper, newspaper, aluminum cans, plastic products: milk jugs and six pack rings, glass bottles or jars, copper, steel, etc...

3. Name a product that Texas manufacturers make from waste paper?

Newsprint, recycled paper, paper pulp, insulation, etc...

4. How are Christmas trees recycled?

They are ground up and used as mulch around people's houses.

5. Why do you want to recycle a Christmas tree?

various answers

6. Give a two minute persuasive speech on why to recycle.

7. What would you tell your neighbor to do to recycle?

various answers.

8. How do you think your school could recycle more wastes?

various answers.

9. What waste in your school could be recycled?

paper, materials for storage such as cardboard boxes, cans, bottles, plastic, food scraps and grass clippings, old computers, etc...

10. Do you think garbage should be taxed? Why, or why not?

various answers.

11. Should waste management companies charge for plastic items?

various answers.

12. Why is it important to recycle paper?

to save trees, reduce energy consumption, save land fill space

13. How can you recycle used clothes?

give them to someone else, yard sale, Goodwill Industries, Red Cross

14. Where does trash go after it leaves your home?

to the landfill or recycle center

15. How can litter harm animals?

answers will vary

### **Waste Jeopardy Questions**

1. A: Three advantages of sanitary landfills.

Q: What are less cost, protecting groundwater, holding all types of garbage, ability to be used as recreational areas after use, containing residue, and a source of alternative energy?

2. A: Three disadvantages of landfills.

Q: What are requiring specific soil types, being accessible to communities, quickly being filled up, and the ability to cause pollution if not managed correctly?

3. A: The percentage by weight of US trash that is discarded packaging.

Q: What is 29.4 percent?

### **Compost Questions**

1. What is compost?

grass clippings, leaves, decaying fruits and vegetables, and manure broken down by microbes to make humus that is used as fertilizer.

2. What are the four materials needed in a compost and where can you find these sources?

Carbon: leaves, twigs, shredded bark, straw, sawdust, nut shells, corn cobs. Micro/Macro - organisms: snails, slugs, earthworms, fungi, mold, millipedes, springtails, pillbugs. Nitrogen: grass clippings, garden weeds, horse/sheep manure, fruit rind and peelings, cottonseed meal. Water: juices from fruits, rain, faucets.

3. Name three things that can cause odors in a compost bin.

any fruit, vegetables, juices, plant clippings

4. Name 3 things that cannot go into a compost bin.

oil, meats, animal droppings

5. Why should we compost?

So waste doesn't go into the landfill

6. What can we do with the composted materials?

use it in our garden or flowers, lawns, trees, crops

7. How can you recycle food products?

compost them

8. Explain what a compost bin is.

It is a container that holds compost while it is decaying.

A compost bin can protect the compost from wind, rain, and sun. Bins can also make composting easier and improves quality.

9. How can maintaining a compost pile benefit the environment?

Compost replaces fertilizers that pollute our water system, by using scraps and grass clippings and our landfills will be less full.

10. How do you make a compost bin?

A. buy, or make your own box structure

B. place it on the ground outside

C. add compost materials inside the box

11. Name one nitrogen source for compost.

Possible answer: Grass clippings, garden weeds, horse/sheep manure, fruit rind and peelings, cottonseed meal

12. Should cat or dog manure be used in compost?

No, because they can spread diseases.

13. What are three advantages to composting with worms?

It takes less space, less work, is a faster way to compost paper, and creates a richer soil.

14. What kind of worms are best for composting?

Red wigglers.

15. Why would you want a worm bin?

various answers.

16. How do you make a worm bin?

A. find a sturdy container (plastic bucket or bin)



- B. drill holes in numerous places throughout the bin
- C. place damp, shredded newspaper on the bottom of the bin
- D. put a couple of hand - fulls of potting soil on top of the newsprint
- E. add the worms and replace the cover
- F. Add vegetable and fruit wastes when available

### **Compost Jeopardy Questions**

1. A: The benefits of mulching.

Q: What is keeping the water from evaporating and providing insulation.

2. A: The response to a neighbor that thinks creating a compost is too much trouble.

Q: What is explaining the benefits of composting such as creating less solid waste, saving money on fertilizer, and creating a good fertilizer?

3. A: Two nutrients essential for composting.

Q: What are carbon and nitrogen?

4. A: Two sources of nitrogen in compost.

Q: What are fresh green grass and also green vegetables?

5. A: Two sources of carbon in compost.

Q: What are twigs, bars, and dried leaves?

6. A: A way for someone who lives in an apartment to compost if they do not have a yard.

Q: What is using a small bin and using fruit or vegetable food scraps for nitrogen or worm bins?

7. A: The term for composting with worms.

Q: What is vermiculture?

### **Miscellaneous**

1. What do you feel is the worst kind of pollution? Why?

2. What do you think is the most important concern for the environment today and why?

various answers.

3. What do you feel is the one most important way that you can prevent pollution?

various answers.

4. What law would you pass to protect our environment?

various answers.

5. What are three ways that your school practices conservation?

- A. recycling paper and cardboard
- B. lessons on conservation
- C. turning off lights when not using them

6. List three ways your school wastes resources:

- A. worksheets!
- B. putting paper in the trash
- C. leaving the lights on

7. What is a habitat?

A home, where something lives

8. What does the TCEQ stand for?

Texas Commission on Environmental Quality

9. What is a synonym for conserve?

save

10. What is an antonym for conserve?

waste

11. What is Woodsy Owl's slogan?

"Give a Hoot, Don't Pollute!"

12. What is point source pollution?

waste management regulated and monitored by the government (example: industrial discharge)

13. Which saves more energy, washing clothes in hot or cold water?

cold water

14. Name three ways you can save energy.

- a. Use less hot water
- b. Turn off electrical appliances
- c. Car pool
- d. Walk or ride bikes
- e. Turn thermostats up in the summer and down in the winter (there are other ways that may be named also)

15. Are natural resources limited or unlimited?

limited

16. What is the purpose of fertilizers?

Fertilizers make plants grow better and to rid the soil of certain pests.

17. What advice would you give to a neighbor who you saw dumping ant killer on an ant mound?

Try using compost tea bags or scrape off top mound and place just a couple of granules of ant killer in bed.

18. When is Texas Recycles Day?

November 15th.

19. What are the four major elements of a habitat?

Oxygen, food, water, shelter, proper balance of all four.

20. List four things conservation does.

Extends limited supplies or makes resources last longer. Drought proofs. Reduces harm to the environment. Saves money. Protects endangered species.

21. Explain the economy issue of ecology.

It is important to protect the environment while not hurting businesses that create jobs for the community.

22. Why don't we see as many birds as we once did?

We are destroying their habitats, also DDT, hunting before hunting laws

### **Miscellaneous Jeopardy**

1. A: Sources of nonpoint source pollution.

Q: What are gasoline, motor oil, antifreeze, road salt, soil, animal wastes, grass clippings, and fallen leaves?

2. A: Adverse biological impacts of nonpoint source pollution.

Q: What are loss of species, destruction of species habitat, alteration of food web, and interruption of ecosystem functions?

3. A: Less waste in the landfill, less watering, and less fertilizer.

Q. How is the environment helped by the restrictions against bagging grass?

4. A: What you would choose if you could only recycle in one day.

Q: Accept answers as long as they can be supported by valid reasons.